

The
OHIO STATE UNIVERSITY
BULLETIN

Volume XXV

JANUARY 31, 1921

Number 10

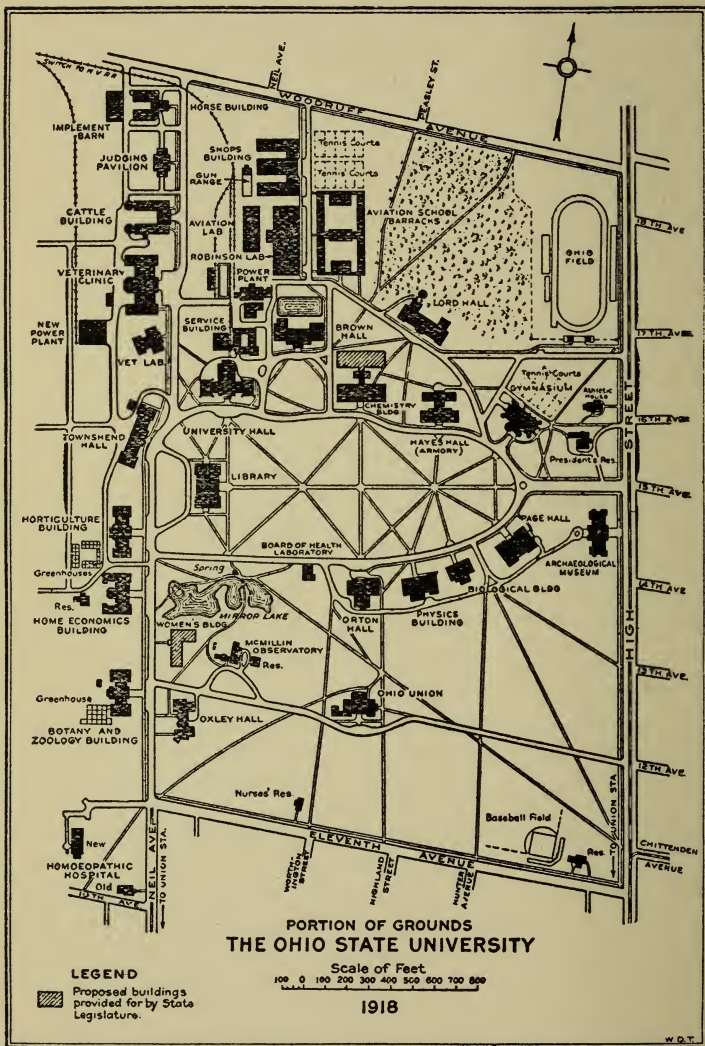
THE LIBRARY
OF THE
UNIVERSITY OF ILLINOIS

APPLIED OPTICS

1921-1922

PUBLISHED BY THE UNIVERSITY AT COLUMBUS

Entered as second-class matter November 17, 1905, at the postoffice at Columbus, Ohio, under Act of Congress, July 16, 1894. Acceptance for mailing at special rate of postage provided for in Section 1103, Act of October 3, 1917. Authorized July 10, 1918.



C
3h 35
V. 25-

UNIVERSITY CALENDAR

1921

Summer Session, Monday, June 20 to Friday, August 12.

Entrance examinations, Tuesday to Saturday, 8 A. M., June 21 to 25.

Entrance examinations, Tuesday to Saturday, 8 A. M., September 6 to 10.

Physical examinations for all new students, Friday to Friday, September 16 to 23.

Registration Day—First Semester—Tuesday, September 20.

President's Annual Address, Wednesday, September 21, 11 A. M.

Intelligence tests for Freshmen in the Engineering College, Thursday and Friday, September 22 and 23, from 10 to 12 A. M.

Intelligence tests for all new students, Saturday, September 24.

Latest date for registration of candidates for a degree at the Commencement in June, 1922, October 1.

Registration Day, Short Courses in Agriculture—First Term—Tuesday, October 18.

Mid-semester reports to the Deans concerning delinquent students, Wednesday, November 9.

Thanksgiving recess begins November 23, 1 P. M., and ends November 29, 8 A. M.

Christmas recess begins Thursday, December 22, 6 P. M.

1922

Christmas recess ends Tuesday, January 3, 8 A. M.

Registration Day, Short Courses in Agriculture—Second Term—Tuesday, January 3.

Final examinations, Wednesday, January 25 to Thursday, February 2.

Farmers' Week, Monday, January 30 to Friday, February 3.

First semester ends Thursday, February 2, 6 P. M.

SECOND SEMESTER

Registration Day—Second Semester—Tuesday, February 7.

University Day, Wednesday, February 22.

Close of Second Term, Short Courses in Agriculture, Friday, March 17.

Mid-semester reports to the Deans, Wednesday, April 5.

Easter recess, Thursday noon, April 13 to Tuesday, April 18, 8 A. M.

Competitive Drill—Cadet Regiment—Saturday, May 27.

Memorial Day, Tuesday, May 30.

Final examinations, Wednesday, May 31 to Thursday, June 8.

Commencement, Tuesday, June 13.

Summer Session, Monday, June 19 to Friday, August 11.

Entrance examinations, Tuesday, June 20 to Saturday, June 24, 8 A. M.

ADMINISTRATION

BOARD OF TRUSTEES

JOHN F. CUNNINGHAM, Chairman.....	Cleveland
JOHN KAISER, Vice-Chairman.....	Marietta
CHARLES F. KETTERING.....	Dayton
GUY W. MALLON.....	Cincinnati
OSCAR E. BRADFUTE.....	Xenia
THOMAS C. MENDENHALL.....	Ravenna
BENJAMIN F. MCCANN.....	Dayton

ADMINISTRATIVE OFFICERS

President..... WILLIAM OXLEY THOMPSON
Office: University Hall—99312; N. 476
Residence: University Grounds—2056

**Secretary of the Board of Trustees and Business
Manager.....** CARL E. STEEB
Office: University Hall (East End)—99332; N. 32
Residence: 1956 Iuka Avenue—5835

**Registrar, University Editor, and Secretary of the
University Faculty.....** EDITH D. COCKINS
Office: 100 University Hall—99314
Residence: 1348 Neil Avenue—16310

University Examiner..... BLAND L. STRADLEY
Office: 107 University Hall—99353; N. 939
Residence: 1778 North High Street—11229

APPLIED OPTICS

Professor and Director..... HOWARD D. MINCHIN
Office: 206 Physics Building—99324
Residence: 164 Thirteenth Avenue—N. 4172

Instructor..... MORGAN C. DAVIES
Residence: 2200 Waldeck Avenue

THE OHIO STATE UNIVERSITY

The Ohio State University is a part of the educational facilities maintained by the State and is located in the northern part of the City of Columbus.

ORGANIZATION

For convenience of administration, the departments of the University are grouped into organizations called colleges. The Ohio State University comprises a graduate school and eleven colleges, each under the administration of a Dean and College Faculty, as follows:

Graduate School	College of Education
College of Agriculture	College of Engineering
College of Arts, Philosophy and Science	College of Homoeopathic Medicine
College of Commerce and Journalism	College of Law
College of Dentistry	College of Medicine
	College of Pharmacy
	College of Veterinary Medicine

SUMMER SESSION

In addition to the above, there is a Summer Session under the supervision of a Director and governing committee for the administration of the regular University courses offered in the summer.

This bulletin is devoted exclusively to the work offered in Applied Optics for the academic year, 1921-1922.

(NOTE—The University publishes a bulletin descriptive of each college. Copies may be obtained by addressing the University Examiner, The Ohio State University, Columbus, Ohio, and stating the college in which the writer is interested.)

APPLIED OPTICS

The Department of Applied Optics offers courses designed to prepare students to enter the field of optics. This field includes visual optics; a study of mirrors, lenses, lens design, lens calculation, and design of optical instruments; spectroscopy.

The courses in visual optics are outlined from the standpoint that the visual properties of the eye are intimately related to all branches of applied optics and also with the view of preparing students to detect and correct the errors of the eye by the use of lenses.

Provision is made for clinical practice in both the refraction and the pathological fields and for practice in the mechanical laboratory.

The courses in general science and mathematics form a basis for the study of theoretical optics and the application of optical principles.

ADMISSION

THE ENTRANCE BOARD

The admission of students is in charge of the University Entrance Board, which determines the credits that shall be issued on all entrance examinations and certificates. Correspondence relative to admission should be addressed to the University Examiner, The Ohio State University, Columbus, Ohio.

ENTRANCE BY DIPLOMA OR EQUIVALENTS

The following persons are eligible to admission without examinations or conditions:

(1) The holder of a diploma from a first-grade high school in the State of Ohio.

(2) The holder of a properly endorsed certificate from such secondary schools as have been accredited or recognized by the University.

(3) The holder of a 60 count Regents' Certificate of the State of New York.

(4) The holder of 15 credit units as determined by the Entrance Board.

ENTRANCE BY EXAMINATION

Deficiencies in requirements for entrance may be removed by examinations given by the University during the months of September and June.

Students over twenty-one years of age may be admitted upon satisfactory evidence that they can successfully pursue the work elected. No degree will be granted unless the full entrance requirements have been fulfilled.

For further information, see the **Bulletin of General Information**, which may be obtained on application to the University Examiner.

It is urged that students who desire to enter the University put themselves in communication with the University Examiner at as early a date as possible.

REGISTRATION

Admission to the University must be secured before registration can be accomplished. Registration consists of the following steps in the order indicated: (1) the securing of a class-card from the Director of the Courses in Applied Optics (office, Physics Building, room 206), (2) the securing of a fee-card from the office of the Registrar, and (3) the payment of the fees at the office of the Bursar.

DEGREE

Upon the satisfactory completion of the four-year curriculum, or what is deemed to be its equivalent, a student will receive the degree of Bachelor of Science in Applied Optics.

EQUIPMENT

The courses are thoroughly equipped with the modern and best forms of optical apparatus. The clinic is provided with schematic eyes with pathological slides, C. & I. ophthalmometer, Universal ophthalmometer, Hardy ophthalmometer with corneal microscope, several DeZeng phorometers, a Wolff skioptometer with batteries of spheres and cylinders, various pieces of muscle-testing apparatus, several self-luminous retinoscopes and ophthalmoscopes, a Geneva combined retinoscope and ophthalmoscope, a perimeter, a Rogers dioptrimeter, interpupillary gauge, vertex dioptrimeter, trial cases, Hertel keratometer, Stevens tropometer, Stevens clinoscope and all the best forms of modern ophthalmic apparatus suitable for refractive and ophthalmic lens purposes. The mechanical laboratory is fully equipped to grind, surface, edge, and mount lenses.

CLINICAL FACILITIES

The clinical laboratory has been enlarged and new equipment added during the present year.

Clinics are open to the students and members of the instructional force in particular and to outsiders upon application. They are conducted every afternoon during the week. These clinics furnish an endless variety of ocular conditions for the inspection and investigation of the students in these courses. Students make the examinations under the supervision of the director of the clinic. These clinics have served between five and six hundred persons each year during the period of their existence. Difficult cases form the basis for a subsequent discussion of methods of examination employed and the interpretation of the data obtained.

FEES AND EXPENSES

GENERAL CHARGES

All University fees must be paid at the opening of each semester as a condition of admission to classes. Registration is not complete until all fees have been paid. No student will have any privileges in the classes or laboratories until all fees and deposits are paid.

Since all fees are due and payable as a part of the student's registration, no person should come to the University for registration without money sufficient to cover all of his fees and deposits.

Matriculation Fee. Every student upon his first admission to the University is required to pay a matriculation fee of \$10.00. This fee is paid but once, and is in addition to other University fees, and entitles the student to the privileges of membership in the University.

Non-Resident Fee. Every undergraduate student who is not a legal resident of the State of Ohio is required to pay a non-resident fee of \$25.00 each semester of his residence in the University in addition to other University fees. The burden of registering under proper residence is placed upon the student. If there is any possible question of his right to legal residence the matter should be brought to the attention of the Registrar and passed upon, previous to registration or the payment of fees. Any student who registers improperly under this rule shall be required to pay not only the non-resident fee, but shall be assessed a penalty of \$10.00.

No person shall be considered eligible to register in the University as a resident of the State of Ohio unless he has resided in the State twelve months next preceding the date of his proposed enrollment; and no person shall be considered to have gained a residence in this State for the purpose of registering in the University while he is a student in the University.

The residence of minors shall follow that of the legal guardian.

The residence of wives shall follow that of husbands.

Aliens who have taken out first citizenship papers and who have been residents of Ohio for twelve months next preceding

the date of their enrollment in the University, shall be regarded as eligible for registration as residents of Ohio.

TUITION

First and Second Years. The tuition fee is \$15.00 each semester.

Third and Fourth Years. The tuition fee is \$50.00 each semester. The total tuition fees for the four years aggregate \$260.00.

Special Students or others who take the courses of the third and fourth years, or any portion thereof, shall pay a fee of \$50.00 each semester.

Laboratory Deposits. Students are required to pay for all materials consumed in laboratory work during the first and second years. A cash deposit is required in each course requiring such materials; the unexpended balance is returned at the end of the semester.

OTHER EXPENSES

The Ohio Union. A fee of one dollar a semester is paid by all male students at registration. This entitles the student to all the privileges of the Union consistent with the Constitution and House Rules governing it.

Graduation Fee. A fee of five dollars to cover expense of graduation and diploma is required of each person receiving one of the ordinary degrees from the University, and this fee must be paid to the Bursar of the University before the degree is conferred. A like fee of ten dollars is charged each person receiving one of the higher graduate degrees.

Rooms and Board. Furnished rooms can be obtained at prices varying from ten to fifteen dollars a month. Board at the restaurants and boarding clubs near the University costs from six and one-half to eight dollars a week. Board, with furnished rooms, can be obtained in private families at rates varying around ten dollars a week.

Board can be secured at the Ohio Union Commons at reasonable rates.

Textbooks. Students should not purchase textbooks until they are advised by the instructors of their respective classes.

COST OF A YEAR'S WORK

One of the most perplexing questions that confronts a prospective student is what the course is going to cost him a year.

In order to furnish information, we have listed below an estimate of the average payments required by the University for the Freshman year, and have estimated the cost of room and boarding at a safe price. These two items are sometimes reduced slightly where two students occupy the same room and where boarding clubs are economically managed. Fees to the University are paid one-half at the beginning of each semester.

Matriculation Fee.....	\$ 10 00
Incidental Fee.....	30 00
Ohio Union.....	2 00
Deposits to cover laboratory materials and breakage.....	30 00
Books.....	30 00
Board—36 weeks at \$8.00 a week.....	288 00
Room Rent, at \$15.00 a month.....	135 00
General expenses.....	100 00
	<hr/>
	\$625 00

The item of general expenses is always subject to the personal habits of the individual and varies according to the degree of economy exercised.

In order to meet all the necessary expenses of registration, books, and other expenditures incident to securing a room and board, a student should come prepared to expend from \$100.00 to \$125.00 during the first ten days of a semester. After that period his board and room rent will constitute the major part of his expenses.

INFORMATION

For further information as to entrance requirements, etc., address the University Examiner. Correspondence is also invited by Howard D. Minchin, Professor of Applied Optics, who will be in his office (Physics Building, room 206) from 9 to 11 a. m., September 16 to 23.

CURRICULUM

LEADING TO THE DEGREE, BACHELOR OF SCIENCE IN
APPLIED OPTICS

FIRST YEAR			
FIRST SEMESTER		SECOND SEMESTER	
Chemistry	(105 or 109) 4	Chemistry	(106 or 110) 4
Elementary or General		Elementary or General	
English	(101) 2	English	(104) 2
Description and Narration		Exposition and Argumentation	
Engineering Drawing	(101) 2	Engineering Drawing	(102) 3
Elementary Mechanical		Mechanical	
Anatomy	(125) 4	Anatomy	(126) 4
Anatomy	(139) 3	Anatomy	(140) 2
Histology		Histology	
SECOND YEAR			
Physics	(103 or 105) 4	Physics	(104 or 106) 4
General		General	
Physiology	(127) 3	Physiology	(128) 3
Mathematics	(121) 3	Mathematics	(122) 3
College Algebra and Trigonometry		Trigonometry and Analytical	
Pathology	(135) 3	Geometry	
*Elective	3	Bacteriology	(150) 4
		*Elective	3
THIRD YEAR			
Anatomy	(145) 4	Optics	(116) 4
The Eye		Vision Optics	
Psychology	(103) 2	Psychology	(104) 3
Elementary		Elementary and Experimental	
Optics	(107) 4	Optics	(108) 5
Theoretical		Theoretical	
Optics	(115) 2	*Elective	3
Vision Optics			
Physiology	(161) 3		
The Eye			
Optics	(110) 2		
Mechanical			
*Elective	3		
FOURTH YEAR			
Optics	(133) 4	Optics	(129) 2
Theoretical Applied Optics		Mechanical	
Pathology	(141) 3	Optics	(134) 4
The Eye		Theoretical Applied Optics	
Optics	(147) 4	Pathology	(142) 3
Clinical Practice		The Eye	
*Elective	3	Optics	(148) 4
		Clinical Practice	
		*Elective	3

*All electives shall be subject to the approval of the Professor of Applied Optics

DEPARTMENTS OF INSTRUCTION

ANATOMY

Office, 105 Biological Building

PROFESSOR LANDACRE, ASSISTANT PROFESSOR BUCK,
AND DEPARTMENT ASSISTANTS

125. **Human Anatomy.** Four credit hours. First semester. Osteology, arthrology, syndesmology and myology, exclusive of the lower portions of the body.

126. **Human Anatomy.** Four credit hours. Second semester. Myology, angiology, splanchnology and peripheral nervous system, exclusive of the lower portions of the body.

139. **Histology.** Three credit hours. First semester. Two recitations or lectures and three laboratory hours each week.

The histology of the tissues, the histology of the organs, with special emphasis laid upon the head and neck regions.

140. **Histology.** Two credit hours. Second semester. One recitation or lecture and two laboratory hours each week.

The histology of the tissues, the histology of the organs, with special emphasis laid upon the head and neck regions.

145. **Anatomy of the Eye.** Four credit hours. First semester. Mr. Landacre.

The comparative anatomy of the vertebrate eye and its associated muscles and nerves, including a dissection of the brain and cerebral nerves of the shark and the skull and gross structure of the mammalian eye; the minute structure and embryology of the mammalian eye, including the study of the human skull and eye.

APPLIED OPTICS

Office, 206 Physics Building

PROFESSOR MINCHIN, MR. DAVIES

107. **Theoretical Optics.** Four credit hours. First semester. Prerequisite, Physics 103-104 or 105-106. Mr. Minchin.

Recitations, lectures, and laboratory work on reflection; refraction and refractive indices; prisms; thin lenses and lens calculations; cylinders; oblique cylinders.

108. Theoretical Optics. Five credit hours. Second semester. Prerequisite, Applied Optics 107. Mr. Minchin.

Recitations, lectures, and laboratory work. Thick lenses; effectivity and back focal length; equivalence of various forms of lenses and of a system of lenses; vertex refraction; chromatic aberration and spherical aberration; diffraction; interference and polarization.

110. Mechanical Optics. Two credit hours. First semester. Mr. Davies.

Practical work in neutralizing; lens centering; use of abrasives; simple surface and edge grinding and drilling. Lectures on the history and manufacture of glass and the various kinds of optical glass.

129. Mechanical Optics. Two credit hours. Second semester. Mr. Davies.

Practical work in lens mounting, both in frame and frameless; simple soldering; face measurements; bridge bending; adjustment of spectacles and eyeglasses. Practice in grinding prisms, prisms in combination and in grinding and finishing bifocal lenses.

115. Vision Optics. Two credit hours. First semester. Mr. Davies.

Recitations, lectures, and demonstrations dealing with the principles of refraction in the human eye based on the laws of conjugate foci; hyperopia, myopia, and astigmatism; ophthalmoscopy and the fundamentals of vision.

116. Vision Optics. Four credit hours. Second semester. Mr. Davies.

Recitations, lectures, and demonstrations covering accommodation, convergence, co-ordination of the visual functions, skiometry, the subjective method of eye correction. A study of the various instruments used in examining the eye. Practice with all such instruments.

133-134. Theoretical Applied Optics. Four credit hours. The year. Mr. Minchin.

Recitations, lectures, and demonstrations on the optical constants of the eye; mathematical and physical methods and cal-

culations applied to the correction of anomalies of the eye; monocular and binocular vision.

The fundamentals of physiological optics will be covered.

In the second semester, optical instruments and their application will be discussed and the subject of spectroscopy will be included.

147-148. Clinical Practice. Four credit hours. The year. Mr. Davies.

One hour a week will be taken for conference. A careful study will be made of selected cases taken from the clinical practice.

One period of two hours will be spent each week at the Hospital. This period will be under the charge of Dr. Ferree and Dr. Sage.

BACTERIOLOGY

Office, 202 Veterinary Laboratory

PROFESSOR MORREY

150. Bacteriology. Four credit hours. Second semester. Mr. Morrey.

Disinfection and sterilization; the preparation of culture media and a thorough study of the pathogenic bacteria of the oral cavity.

CHEMISTRY

Office, 100 Chemistry Building

PROFESSORS McPHERSON AND EVANS, AND DEPARTMENT ASSISTANTS

105. Elementary Chemistry. Four credit hours. First semester. One lecture, one quiz, and six laboratory hours each week. No prerequisite. Mr. Evans and department assistants.

An introductory course in the chemistry of the non-metals arranged for students who have not offered chemistry as a unit for admission to the University. This course is to be followed by Chemistry 106 in the second semester.

106. Elementary Chemistry and Qualitative Analysis. Four credit hours. Second semester. One lecture, one quiz, and six laboratory hours each week. Prerequisite, Chemistry 105. Mr. Evans and department assistants.

An introductory course in the chemistry of the metals, the

laboratory work constituting an elementary course in qualitative analysis.

109. General Chemistry. Four credit hours. First semester. One lecture, one quiz, and six laboratory hours each week. Prerequisite, 1 unit of chemistry offered for admission to the University. Mr. Evans and department assistants.

A general course in the chemistry of the non-metals arranged for students who have had a satisfactory course in chemistry in the secondary schools. This course is to be followed by Chemistry 110 in the second semester.

110. General Chemistry and Qualitative Analysis. Four credit hours. Second semester. One lecture, one quiz, and six laboratory hours each week. Prerequisite, Chemistry 109. Mr. Evans and department assistants.

A general course in the chemistry of the metals, the laboratory work constituting an introductory course in qualitative analysis.

ENGINEERING DRAWING

Office, 204 Brown Hall

PROFESSORS FRENCH AND MEIKLEJOHN, AND DEPARTMENT ASSISTANTS

101. Elementary Mechanical Drawing. Two credit hours. First semester. All instructors.

Practice in the use of drawing instruments, elementary projections.

102. Mechanical Drawing. Three credit hours. Second semester. All instructors.

Lettering, orthographic, isometric and oblique projections.

ENGLISH

Office, 103 Physics Building

PROFESSORS DENNEY AND BECK, AND DEPARTMENT ASSISTANTS

101. Paragraph Writing: Description and Narration. Two credit hours. First semester. Texts: Scott and Denney's Para-

graph Writing, and Duncan, Beck and Graves's Specimens of Prose Composition. All instructors.

104. Paragraph Writing: Exposition and Argumentation. Two credit hours. Second semester. All instructors.

MATHEMATICS

Office, 314 University Hall

PROFESSOR SWARTZEL, ASSOCIATE PROFESSOR ARNOLD

121. College Algebra and Trigonometry. Three credit hours. First semester. Mr. Swartzel, Mr. Arnold.

122. Plane Trigonometry and Analytical Geometry. Three credit hours. Second semester. Mr. Swartzel, Mr. Arnold.

PATHOLOGY

Office, 710 North Park Street

PROFESSOR SCOTT

135. Pathology. Three credit hours. First semester. Mr. Scott.

General pathology, including the etiology of diseases, distribution of nutrition, inflammation and tumors.

141-142. Pathology of the Eye. Three credit hours. The year. Mr. Scott.

A laboratory course covering the gross and histological lesions involving the eye.

PHYSICS

Office, 107 Physics Building

PROFESSORS COLE AND EARHART

103-104. General Physics. Four credit hours. The year. Mr. Earhart.

A non-mathematical course for students who have no entrance credit in physics.

105-106. General Physics. Four credit hours. The year.

**PHYSIOLOGY, PHYSIOLOGICAL CHEMISTRY AND
PHARMACOLOGY**

Office, 104 Biological Building

ASSISTANT PROFESSOR McPEEK AND DEPARTMENT ASSISTANTS

127. Physiology. Three credit hours. First semester. Mr. McPeek and assistants.

The physiology of unicellular structures, muscle and nerve, central nervous system, autonomic system, external and internal senses, blood and heart. Reports of papers by students.

128. Physiology. Three credit hours. Second semester. Mr. McPeek and assistants.

The physiology of the circulatory and respiratory mechanisms, digestion, excretion, metabolism, etc.

161. Physiology of the Eye. Three credit hours. First semester. Mr. McPeek.

PSYCHOLOGY

Office, 403 University Hall

PROFESSORS ARPS, PINTNER, AND WEISS, AND DEPARTMENT
ASSISTANTS

103-104. Elementary Psychology. Two credit hours. The year.

111. Experimental Psychology: Introduction. Three credit hours. First semester.

Topics: The sense fields, geometrical optical illusions, stereoscopic and pseudoscopic illusions, tactual space perceptions, auditory localization, attention, reaction-time, memory types, tonal fusion, association and analysis of judgment.



3 0112 105797101

The Ohio State University Bulletin is issued thirty times during the year: monthly in June, July, August, September, and October; tri-monthly in November, December, and January; weekly in February, March, April, and May.